Generation of insulin-producing pancreatic islet-like clusters in vitro

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The pancreatic progenitor cells have not been characterized and no specific markers are presently available for conclusive identification of these cells. The identification of such cells is very important as they can be used as a source of transplantable material to replace the population of islets cells destroyed in the case of type I diabetes disease. Our laboratory is interested in the characterization of adult pancreatic stem and progenitor cells. Here we present an in vitro pancreatic culture system for generation of new human islets from islet-enriched cell populations. In this system the cells outgrowing from the islets express CNS progenitor cell marker, nestin and pancreatic epithelial cell marker, cytokeratin 19. These cells undergo differentiation and form new islet-like cell clusters expressing an early pancreatic-endocrine transcription factor pdx-1. When maintained in culture for longer periods of time, the cell clusters continue to mature and accumulate islet hormones insulin, glucagon and somatostatin. When exposed to glucose and other insulin release agonists in vitro, human islet clusters release insulin. Moreover, when implanted in vivo, they release insulin into circulation in response to glucose. This system will provide a framework for designing strategies for generation of large quantities of new islets for transplantation. It will also be useful for characterization of pancreatic progenitor and stem cells